

**The Directed Shark Gillnet Fishery:  
Right Whale Season, 2001**

John K. Carlson  
National Marine Fisheries Service  
Southeast Fisheries Science Center  
3500 Delwood Beach Road  
Panama City, FL 32408

SFD Contribution PCB-01/02-001

## Introduction

Observations of the east Florida-Georgia shark drift gillnet fishery have been previously conducted and reports of the catch and bycatch from these observations were developed (Trent et al., 1997; Carlson and Lee, 1999; Carlson and Lee, 2000; Carlson, 2000). The Atlantic Large Whale Take Reduction Plan and The Biological Opinion issued under Section 7 of the Endangered Species Act mandate that, with respect to the southeast shark gillnet fishery, 100% observer coverage is required during the Right Whale Season (15 Nov-1 Apr) for vessels operating from West Palm Beach, FL to Sebastian Inlet, FL. The objectives of this report are to document protected species bycatch and to estimate catch and bycatch rates in the southeast US coastal directed shark gillnet fishery for the right whale season, 2001.

## Methods

Methods as described by Carlson and Lee (1999) were employed. Observations were made as the net was hauled aboard. The observer remained about 3-8 m forward of the net reel in a position with an unobstructed view and recorded species, numbers and lengths ( $\pm 30$  cm) of sharks and other species caught as they were suspended in the net just after passing over the power roller. Weights (in kg) were estimated from these estimated lengths using length-weight relationships provided Kohler et al. (1998), Castro (1993), and Carlson (unpublished data). When species identification was questionable, the crew stopped the reel so that the observer could examine the animal(s) for positive identification. Disposition of each species brought onboard was recorded as kept, discarded alive, or discarded dead. Data were submitted to the SEFSC Sustainable Fisheries Division on a weekly basis. The data were entered by SEFSC staff, examined by NMFS SEFSC Sustainable Fisheries Division staff, and reviewed with Johnson Controls contract staff to resolve any questions.

## Results and Discussion

### *Strikenet Fishery*

Strikenet vessels and fishing techniques has been previously described in Carlson (2000). For the right whale season 2001, strikenet vessels carried nets ranging from 457.2-914.4 m long and 22.8-27.4 m deep. Mesh sizes ranged from 12.7-38.1 cm. Sets averaged 0.14 hrs ( $\pm 0.5$  S.D.) and soak times (time net was first set minus time haulback began) averaged 0.59 hrs ( $\pm 0.1$

S.D.). Haulback averaged 1.55 hrs ( $\pm 0.9$  S.D.). The entire strikenetting process (time net was first set minus time haulback was completed) averaged 2.2 hrs ( $\pm 0.9$  S.D.).

A total of 12 strikenet sets were observed from 2/26/01-3/24/01. However, approximately 20 additional trips were made when the observer departed with the vessel but no strike was made. Reasons for not striking for sharks included the inability to locate the school, sharks located in state waters, and poor weather conditions. All strikenet fishing activities occurred during daylight hours. Observed strikenet fishing effort occurred between approximately 26° 32' -27° 18' N (Figure 1).

#### *Observed strikenet catches*

Observed catch in the strikenet fishery consisted of 4 species of sharks (99.9% of total number caught) and 3 species of teleosts and rays (0.1% of total number caught) (Table 1). No marine mammals or sea turtles were observed caught. The blacktip shark, *Carcharhinus limbatus*, made up 99.9% of the number of sharks caught. Bycatch included great barracuda, *Sphyraena barracuda*, Atlantic guitar fish, *Rhinobatus lentiginosus*, and gray triggerfish, *Balistes capricus*.

Table 1. Total strikenet shark catch and bycatch by species and species disposition in order of decreasing abundance during all observer trips during the right whale season, 2001.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Carcharhinus limbatus</i>	Blacktip shark	3037	100.0	0.0	0.0
<i>Sphyraena barracuda</i>	Great barracuda	2	100.0	0.0	0.0
<i>Rhinobatus lentiginosus</i>	Atlantic guitarfish	1	0.0	100.0	0.0
<i>Ginglymostoma cirratum</i>	Nurse shark	1	0.0	100.0	0.0
<i>Carcharhinus leucas</i>	Bull shark	1	100.0	0.0	0.0
<i>Carcharhinus acronotus</i>	Blacknose shark	1	100.0	0.0	0.0
<i>Balistes capricus</i>	Gray triggerfish	1	0.0	100.0	0.0

### *Driftnet fishery*

A total of 70 driftnet sets were observed from 1/27/01-3/12/01 in two major areas: between approximately 27° 10'-27° 51' N and 24° 37'-24° 58' N (Figure 1). Driftnet vessels carried nets ranging in length from 365.8-2,407.9 m; depths from 10.6-13.7 m and mesh sizes from 10.2-38.1 cm. With the exception of trips observed northwest of Key West, FL, usually only one set was made per night and the vessel returned to port the following morning. Trips observed northwest of Key West, FL remained at sea for several days. For all observed driftnet sets, set duration averaged 0.43 hrs ( $\pm 0.2$  S.D.). Haulback and processing of the catch averaged 3.8 hrs ( $\pm 2.8$  S.D.). Average soak time for the driftnet (time net was first set minus time haulback began) was 7.5 hrs ( $\pm 3.7$  S.D.).

### *Observed driftnet catches*

The observed driftnet catch consisted of 12 species of sharks, 34 species of teleosts and rays, 3 species of sea turtle and 2 species of marine mammals. Total observed catch composition (percent of numbers caught) were 92.62% sharks, 5.65% teleosts, 1.58% rays, 0.10% sea turtles, and 0.04% marine mammals. Four species of sharks made up 94.3% (by number) of the observed shark catch (Table 2). These species were the blacktip shark (32.3%), bonnethead shark, *Sphyrna tiburo* (31.2%), Atlantic sharpnose, *Rhizoprionodon terraenovae* (22.0%), and finetooth shark, *Carcharhinus isodon* (8.8%). By weight, the shark catch was made up primarily of blacktip shark (40.1%), bonnethead (17.5%), Atlantic sharpnose shark (14.4%), scalloped hammerhead shark, *Sphyrna lewini* (9.4%), and great hammerhead shark, *Sphyrna mokarran* (8.9%).

Table 2. Total directed shark catch by species and species disposition in order of decreasing abundance during all observer trips.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Carcharhinus limbatus</i>	Blacktip	4774	99.9	0.1	0.0
<i>Sphyrna tiburo</i>	Bonnethead	4617	99.8	0.1	0.1
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	3259	100.0	0.0	0.0
<i>C. isodon</i>	Finetooth	1302	100.0	0.0	0.0
<i>C. acronotus</i>	Blacknose	374	100.0	0.0	0.0
<i>S. lewini</i>	Scalloped hammerhead	168	98.2	0.0	1.8
<i>C. brevipinna</i>	Spinner	141	100.0	0.0	0.0
<i>S. mokarran</i>	Great hammerhead	129	100.0	0.0	0.0
<i>C. leucas</i>	Bull	12	75.0	0.0	25.0
<i>Galeocerdo cuvieri</i>	Tiger	5	100.0	0.0	0.0
<i>Alopias vulpinus</i>	Common thresher	4	100.0	0.0	0.0
Lamniformes	Unknown mackerel shark	3	100.0	0.0	0.0
<i>C. plumbeus</i>	Sandbar	2	100.0	0.0	0.0
Carcharhinidae	Unknown requiem shark	1	100.0	0.0	0.0

Three species of teleosts and rays made up 70.4% by number of the overall non-shark species. King mackerel, *Scomberomorus cavalla* (29.7%); cownose ray, *Rhinoptera bonasus* (18.4%); cobia, *Rachycentron canadum* (13.7%); and red drum, *Sciaenops ocellatus* (8.6%) dominated the bycatch (Table 3).

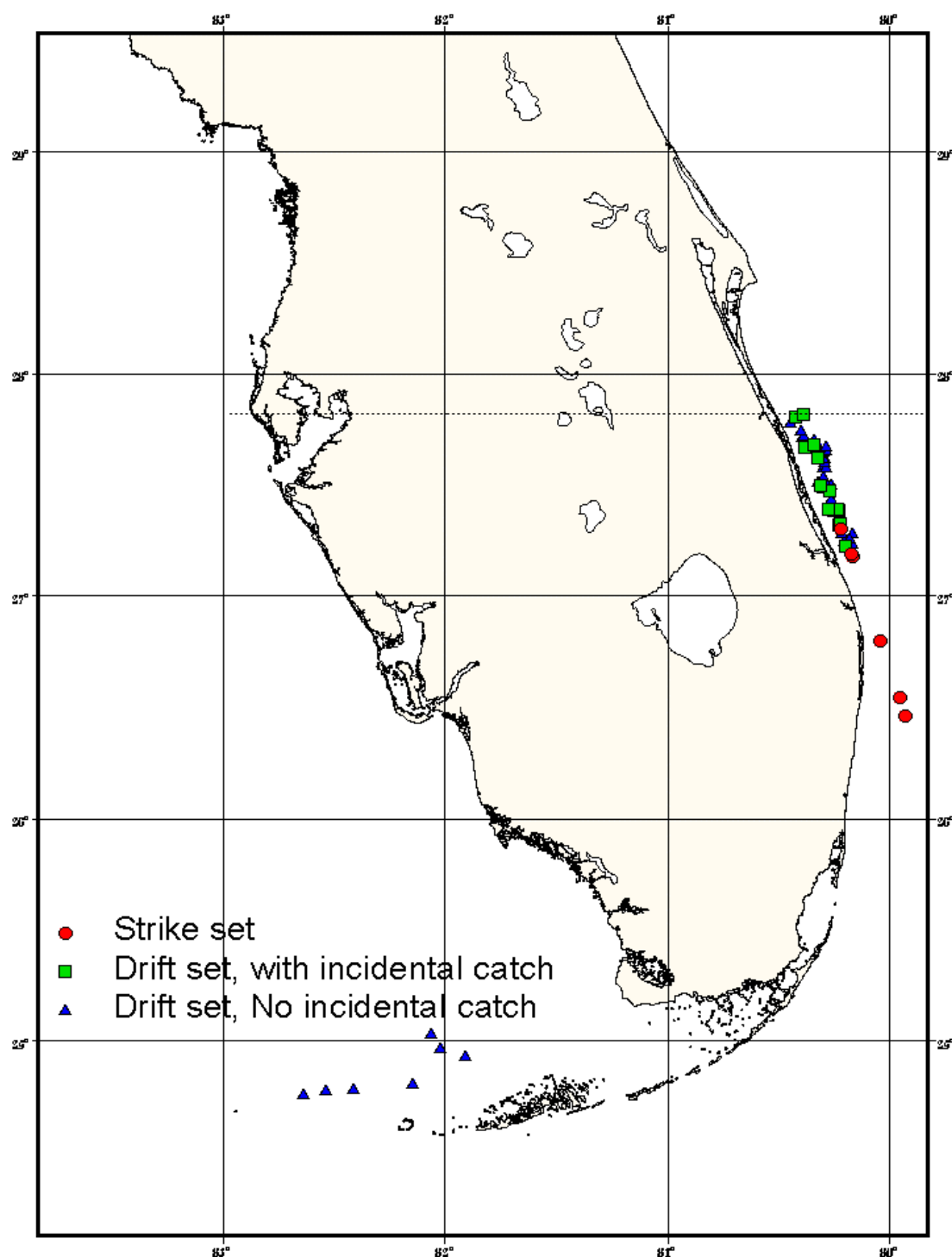


Figure 1. Distribution of observed strike and drift gillnet sets during the right whale season, 2001. Dotted horizontal line represents the division (27° 51' N. Latitude) between SEUS Restricted Area to the north and SEUS Observer Area to the south.

### *Disposition of catch*

Portions of both the targeted catch (sharks) and incidental catch were discarded. The proportions discarded varied between strikenet and driftnet catches. In the strikenet fishery, 0.03% of sharks were discarded (Table 1). For incidental catch taken in the strikenet fishery, only great barracuda was retained (100%) with the remaining bycatch discarded alive (100%).

For incidental driftnet catch species, the highest proportion discarded dead (with observed catch greater than 10 specimens) was for king mackerel (71.7%), red drum (55.6%), little tunny (42.9%), remora (41.2%), Atlantic sailfish (41.6%) and bluefish (12.2%) (Table 3). Spotted eagle rays, cownose rays, and manta rays had the highest discard proportion alive; 100.0%, 94.8%, and 93.8%, respectively.

Table 3. Total driftnet teleost and ray bycatch caught by species in order of decreasing abundance and species disposition during all observer trips.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Scomberomorus cavalla</i>	King mackerel	343	28.3	0.0	71.7
<i>Rhinoptera bonasus</i>	Cownose ray	213	3.3	94.8	1.9
<i>Rachycentron canadum</i>	Cobia	159	88.1	3.1	8.8
<i>Sciaenops ocellatus</i>	Red drum	99	22.2	22.2	55.6
<i>Sphyrna barracuda</i>	Great barracuda	63	100.0	0.0	0.0
<i>Pomatomus saltatrix</i>	Bluefish	41	82.9	4.9	12.2
<i>Scomberomorus maculatus</i>	Spanish mackerel	30	100.0	0.0	0.0
<i>Euthynnus alletteratus</i>	Little tunny	28	57.1	0.0	42.9
<i>Aetobatus narinari</i>	Spotted eagle ray	24	0.0	100.0	0.0
<i>Caranx hippos</i>	Crevalle jack	21	100.0	0.0	0.0
<i>Echeneidae</i>	Remora	17	0.0	58.8	41.2
<i>Manta birostris</i>	Atlantic manta ray	16	0.0	93.8	6.2
<i>Lobotes surinamensis</i>	Tripletail	13	92.3	7.7	0.0
<i>Istiophorus platypterus</i>	Atlantic sailfish	12	41.6	16.6	41.6
<i>Acanthocybium solanderi</i>	Wahoo	9	100.0	0.0	0.0
<i>Opisthonema oglinum</i>	Atlantic thread herring	9	0.0	0.0	100.0

<i>Thunnus atlanticus</i>	Blackfin tuna	6	83.3	0.0	16.4
<i>Caranx crysos</i>	Blue runner	5	100.0	0.0	0.0
<i>Archosargus probatocephalus</i>	Sheepshead	4	100.0	0.0	0.0
<i>Balistidae</i>	Triggerfish	2	0.0	50.0	50.0
<i>Megalops atlanticus</i>	Tarpon	2	0.0	0.0	100.0
<i>Mycteroperca microlepis</i>	Gag grouper	2	100.0	0.0	0.0
<i>Naucrates ductor</i>	Pilot fish	2	0.0	0.0	100.0
<i>Scomberomorus regalis</i>	Cero	2	100.0	0.0	0.0
<i>Chloroscombrus chrysurus</i>	Atlantic bumper	1	0.0	0.0	100.0
<i>Coryphaena hippurus</i>	Dolphin	1	100.0	0.0	0.0
<i>Dasyatis centroura</i>	Southern stingray	1	0.0	0.0	100.0
<i>Lactophrys quadricornis</i>	Scrawled cowfish	1	0.0	100.0	0.0
<i>Narcine brasiliensis</i>	Lesser electric ray	1	0.0	100.0	0.0
<i>Pogonias cromis</i>	Black drum	1	0.0	100.0	0.0
<i>Sarda sarda</i>	Atlantic bonito	1	100.0	0.0	0.0
<i>Selene setapinnis</i>	Atlantic moonfish	1	0.0	0.0	100.0
<i>Squantini dumerilli</i>	Atlantic angel shark	1	0.0	100.0	0.0
<i>Tetrapturus pfluegeri</i>	Longbill spearfish	1	0.0	0.0	100.0
<i>Unidentified teleost</i>		1	0.0	0.0	100.0

#### *Protected resource interactions*

Interactions with protected resources (23 individuals) occurred in 13 separate sets. The species of sea turtle incidentally taken included leatherback, *Dermochelys coriacea*, loggerhead, *Caretta caretta*, and hawksbill, *Eretmochelys imbricata*. Two species of dolphin, Atlantic spotted dolphin, *Stenella frontalis*, and bottlenose dolphin, *Tursiops truncatus*, were encountered. Mortalities were reported for 4 bottlenose dolphin, 2 leatherback turtles, 1 Atlantic spotted dolphin. (Table 4).



Table 4. Protected resource interactions in the directed shark gillnet fishery for right whale season, 2001. No interactions occurred during strikenet operations.

LANDING DATE	LATITUDE LONGITUDE	SPECIES	DISPOSITION
2/01/01	27° 26' 36 N	<i>Dermochelys coriacea</i>	Released alive
	80° 10' 47 W	<i>Dermochelys coriacea</i>	Released alive
2/2/01	27° 49' 47 N	<i>Dermochelys coriacea</i>	Released alive
	80° 19' 44 W		
2/07/01	27° 27' 02 N	<i>Dermochelys coriacea</i>	Released alive
	80° 10' 08 W		
2/14/01	27° 27' 05 N	<i>Dermochelys coriacea</i>	Released condition unknown
	80° 11' 25 W	<i>Dermochelys coriacea</i>	Released condition unknown
		<i>Tursiops truncatus</i>	Discarded dead
2/15/01	27° 41' 39 N	<i>Dermochelys coriacea</i>	Released alive
	80° 15' 16 W		
2/16/01	27° 22' 00 N	<i>Stenella frontalis</i>	Released alive
	80° 10' 00 W	<i>Stenella frontalis</i>	Released alive
2/22/01	27° 18' 02 N	<i>Dermochelys coriacea</i>	Released alive
	80° 09' 09 W	<i>Dermochelys coriacea</i>	Released alive
2/23/01	27° 26' 46 N	<i>Dermochelys coriacea</i>	Released alive
	80° 09' 35 W	<i>Tursiops truncatus</i>	Discarded dead
2/27/01	27° 21' 40 N	<i>Dermochelys coriacea</i>	Released alive
	80° 09' 51 W		
2/27/01	27° 19' 03 N	<i>Dermochelys coriacea</i>	Discarded dead
	80° 08' 56 W	<i>Dermochelys coriacea</i>	Discarded dead
		<i>Stenella frontalis</i>	Discarded dead
3/01/01	27° 39' 44 N	<i>Caretta caretta</i>	Released alive
	80° 14' 11 W		
3/01/01	27° 37' 47 N	<i>Dermochelys coriacea</i>	Released alive
	80° 15' 11 W	<i>Tursiops truncatus</i>	Discarded dead
3/1/01	27° 26' 13 N	<i>Eretmochelys imbricata</i>	Released comatosed
	80° 13' 09 W	<i>Tursiops truncatus</i>	Discarded dead

## References

- Carlson, J. K. and D. W. Lee. 1999. Catch and bycatch in the shark drift gillnet fishery off east Florida during the critical right whale season, 1999. Sustainable Fisheries Division Contribution No. SFD-98/99-60: 13p.
- Carlson, J. K. and D. W. Lee. 2000. The directed shark drift gillnet fishery: catch and bycatch 1998-1999. Sustainable Fisheries Division Contribution No. SFD-99/00-87: 11p.
- Carlson, J. K. 2000. Progress Report on the directed shark gillnet fishery: right whale season, 2000. Sustainable Fisheries Division Contribution No. SFD-99/00-90. 12 p.
- Castro, J.I. 1993. The biology of the finetooth shark, *Carcharhinus isodon*. Env. Biol. Fish. 36:219-232.
- Kohler, N.E., J.G. Casey, and P.A. Turner. 1994. Length-weight relationships for 13 species of sharks from the western North Atlantic. Fish. Bull. 93:412-418.
- Trent, L. , D.E. Parshley and J.K. Carlson. 1997. Catch and bycatch in the shark drift gillnet fishery off Georgia and east Florida. Mar. Fish. Rev. 59(1):19-28.